CLAIMS

What is claimed is:

1. An optoelectronic assembly for an electronic system comprising:

a transparent substrate having a first surface and an opposite second surface, said transparent substrate being thermally conductive and being metallized on said second surface;

a support electronic chip set configured for at least one of providing multiplexing, demultiplexing, coding, decoding and optoelectronic transducer driving and receive functions, said support electronic chip set bonded to said second surface of said transparent substrate;

a first substrate having a first surface and an opposite second surface, said first surface in communication with said transparent substrate via said metallized second surface and said support chip set therebetween;

a second substrate in communication with said second surface of said first substrate, said second substrate configured for mounting at least one of data processing, data switching and data storage chips;

an optoelectronic transducer in signal communication with said support electronic chip set; and

an optical signaling medium defined with one end having an optical fiber array aligned with said optoelectronic transducer substantially normal to said first surface of said transparent substrate;

wherein an electrical signal from the support electronic chip set is communicated to the optoelectronic transducer via said metallized second surface of said transparent substrate, and

wherein the support electronic chip set and the optoelectronic transducer share a common thermal path for cooling.

2. The assembly of Claim 1, further comprising:

a heat spreader having a first and second surface, said heat spreader having a substantially matched CTE with Si, said heat spreader configured to receive said fiber array therethrough to maintain optical communication through said first substrate to said optoelectronic transducer, said first surface in thermal communication with a heat sink while said second surface is in thermal communication with said first surface of said transparent substrate, said heat spreader configured to provide unimpeded heat flow from said second surface to said first surface.

3. The assembly of claim 2, wherein said heat spreader is one of SiSiC, AlN, and CTE matched sintered Diamond.

4. The assembly of Claim 1, wherein:

the second substrate comprises a multi-chip module, a dual-chip module, a single-chip module, or any combination thereof; and

the first substrate is one of an organic and a ceramic substrate containing electrical interconnects.

5. The assembly of Claim 1, wherein:

said electrical signaling medium is said metallized surface of said transparent substrate between said support electronic chip set and said optoelectronic transducer.

6. The assembly of Claim 1, wherein:

the first substrate includes a cavity configured in the first surface to receive said support electronic chip set and said optoelectronic transducer therein.

7. The assembly of Claim 1, wherein the optical signaling medium includes an optical fiber cable bundle and a connector having a m x n optical fiber array incorporated therewith for communication with another optoelectronic assembly.

8. The assembly of Claim 7, further comprising a heat sink configured with a connector receptacle to receive said connector, said heat sink in thermal communication with said first surface of said transparent substrate.

9. The assembly of Claim 1, wherein an end defining said fiber array is bonded with one of thermo-compression and transparent, optically conductive adhesive relative to said first surface of said transparent substrate in optical communication with said optoelectronic transducer.

10. The assembly of Claim 1, wherein said transparent substrate is one of transparent aluminum nitride (t-AIN) and sapphire.

11. The assembly of Claim 1, wherein the electrical connection between the first and second substrate uses micro solder balls with a pitch of less than or equal to about 500 microns.

12. The assembly of Claim 1, further comprising at least one optical connector alignment means extending through said transparent substrate, said at least one optical connector alignment means configured to align said fiber array with said optoelectronic transducer.

13. An optoelectronic assembly for an electronic system comprising:

a support electronic chip set configured for at least one of providing multiplexing, demultiplexing, coding, decoding and optoelectronic transducer driving and receive functions

a transparent substrate having a first and second surface, said first surface configured as a first planar surface to thermally couple with a heat sink while said second surface is in communication with said optoelectronic transducer;

a first substrate having a first surface and an opposite second surface, said first surface in combination with said transparent substrate carrier providing an electrical signaling medium with and between the support electronic chip set and an optoelectronic transducer in signal communication with the support electronic chip set;

a second substrate in communication with said second surface of said first substrate, said second substrate configured for directly mounting at least one of data processing, data switching and data storage chips; and

an optical signaling medium defined with one end having an optical fiber array aligned with said optoelectronic transducer substantially normal to said first surface of said transparent substrate and a surface normal to said first surface,

wherein the electronic chip set and the optoelectronic transducer share a common thermal path for cooling through the transparent substrate.

14. The assembly of claim 13, further comprising:

a heat spreader having a first and second surface, said heat spreader having a substantially matched CTE with Si, said heat spreader configured to receive said fiber array therethrough to maintain optical communication through said first substrate to said optoelectronic transducer, said first surface in thermal communication with the heat sink while said second surface is in thermal communication with said first surface of said transparent substrate, said heat spreader configured to provide unimpeded heat flow from said second surface to said first surface.

15. The assembly of claim 14, wherein said heat spreader is one of SiSiC, AlN, and CTE matched sintered Diamond.

16. The assembly of Claim 13, wherein:

the second substrate comprises a multi-chip module, a dual-chip module, a single-chip module, or any combination thereof; and

the first substrate is an organic or a ceramic substrate containing electrical interconnects, wherein the electrical connection between the first and second substrate uses micro solder balls with a pitch of less than or equal to 500 microns.

17. The assembly of Claim 13, wherein:

the electrical signaling medium includes metallization on said second surface of said transparent substrate between the support electronic chip set and the optoelectronic transducer.

18. The assembly of Claim 13, wherein:

the first substrate includes a shelf or recess configured in the first surface to receive the support electronic chip set therein in communication with the optoelectronic transducer.

19. A method of fabricating an optoelectronic assembly for communicating a signal from a system electronic chip set on an MCM, the system electronic chip set adapted for at least one of data processing, data switching, and data storage, to another component in a computer system, the method comprising:

metallizing a first surface of a transparent substrate as an electrical signaling medium between the support electronic chip set and the optoelectronic transducer on the combination of the transparent substrate and the chip carrier for electrical interconnection thereof;

where the support electronic chip set is configured for at least one of providing multiplexing, demultiplexing, coding, decoding and optoelectronic transducer driving and receive functions;

bonding the support electronic chip set and optoelectronic transducer to the chip carrier;

interconnecting electrically the support electronic chip set to the optoelectronic transducer via the metallized transparent substrate;

attaching the chip carrier to a second substrate;

attaching a heat sink to a second surface opposite said first surface of said transparent substrate, said heat sink configured with a connector receptacle configured to receive a fiber array connector therein and provide optical communication through said second surface to said optoelectronic transducer; and

bonding a fiber array disposed in the fiber array connector to the transparent substrate optically aligned with the optoelectronic transducer to provide an optical signaling medium to the optoelectronic transducer,

wherein the electronic chip set and the optoelectronic transducer share a common thermal path for cooling thereof.

20. The method of Claim 19, wherein the fiber array connector includes a make once connector having a fiber cable bundle extending therefrom.

21. The method of claim 19, wherein said bonding said fiber array to the transparent substrate is substantially one of normal and coplanar with said transparent substrate.

22. The method of claim 19, further comprising:

a SiC heat spreader having a first and second surface, said SiC heat spreader configured to receive said fiber array therethrough to maintain optical communication through said first substrate to said optoelectronic transducer, said first surface in thermal communication with a heat sink while said second surface is in thermal communication with said first surface of said transparent substrate, said SiC heat spreader configured to provide unimpeded heat flow from said second surface to said first surface.

23. The method of claim 19, wherein attaching the second substrate comprises a multi-chip module, a dual-chip module, a single-chip module, or any combination thereof; and the first substrate is an organic or a ceramic substrate containing electrical interconnects, wherein the electrical connection between the first and second substrate uses micro solder balls with a pitch of less than or equal to 500 microns.